

What is claimed is:

- 1 1. A method of ablation laser-machining, comprising:
 - 2 generating pulses at 1 to 50 MHz by one or more semiconductor-chip laser diodes, each
 - 3 pulse having a pulse-duration less than three picoseconds;
 - 4 directing a less than 1 square mm beam of the pulses to a work-piece with an ablating
 - 5 pulse-energy-density; and
 - 6 scanning the beam with a power-driven scanner to ablate a scanned area at least 25 times
 - 7 larger than the beam area.
- 1 2. The method of claim 1, wherein the pulse-energy-density is 0.1 to 20 Joules/square
- 2 centimeter.
- 1 3. The method of claim 1, wherein scanned area at least 100 times larger than the beam
- 2 area.
- 1 4. The method of claim 1, wherein the pulse-duration is 50 femtoseconds to 1 picosecond.
- 1 5. The method of claim 1, wherein beam area is 1 to 2,500 square microns.
- 1 6. The method of claim 1, wherein the pulse-energy-density is between 0.1 and 8
- 2 Joules/square centimeter on the work-piece.
- 1 7. The method of claim 1, wherein the pulses are generated at 0.1 to 50 MHz.
- 1 8. The method of claim 1, wherein the beam is scanned in one direction.
- 1 9. The method of claim 1, wherein the beam is scanned in two directions.
- 1 10. The method of claim 1, wherein the beam is scanned in a spiral.
- 1 11. A method of ablation laser-machining, comprising:

2 generating 0.6 to 100 MHz pulses, each pulse having a pulse-duration less than three
3 picoseconds;

4 directing a less than 1 square mm beam of the pulses to a work-piece with an ablating
5 pulse-energy-density; and

6 scanning the beam with a power-driven scanner over a scanned area at least 25 times
7 larger than the beam area.

1 12. The method of claim 11, wherein the ablation is part of a surgical procedure.

1 13. The method of claim 11, wherein the ablation is part of a surgical procedure, and the
2 ablating pulse-energy-density is between 1 and 10 times the ablation threshold.

1 14. The method of claim 11, wherein the ablation is part of a surgical procedure, and the
2 ablating pulse-energy-density is between 1 and 3 times the ablation threshold.

1 15. The method of claim 11, wherein the pulses are generated by at least one optical
2 amplifier.

1 16. The method of claim 11, wherein the pulses are generated by one semiconductor optical
2 amplifier (SOA) and the pulses contain less than about 50 micro-Joules per pulse.

1 17. The method of claim 11, wherein the pulses are generated by one fiber amplifier and the
2 pulses contain less than 10 micro-Joules per pulse.

1 18. The method of claim 11, wherein the beam is rasterized.